

# A GARR cloud region at EMSO Western Ionian Facility

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# OUTLINE

EMSO ERIC  
EMSO Western Ionian Facility  
PON InSea  
EMSO Data Center

# EMSO ERIC

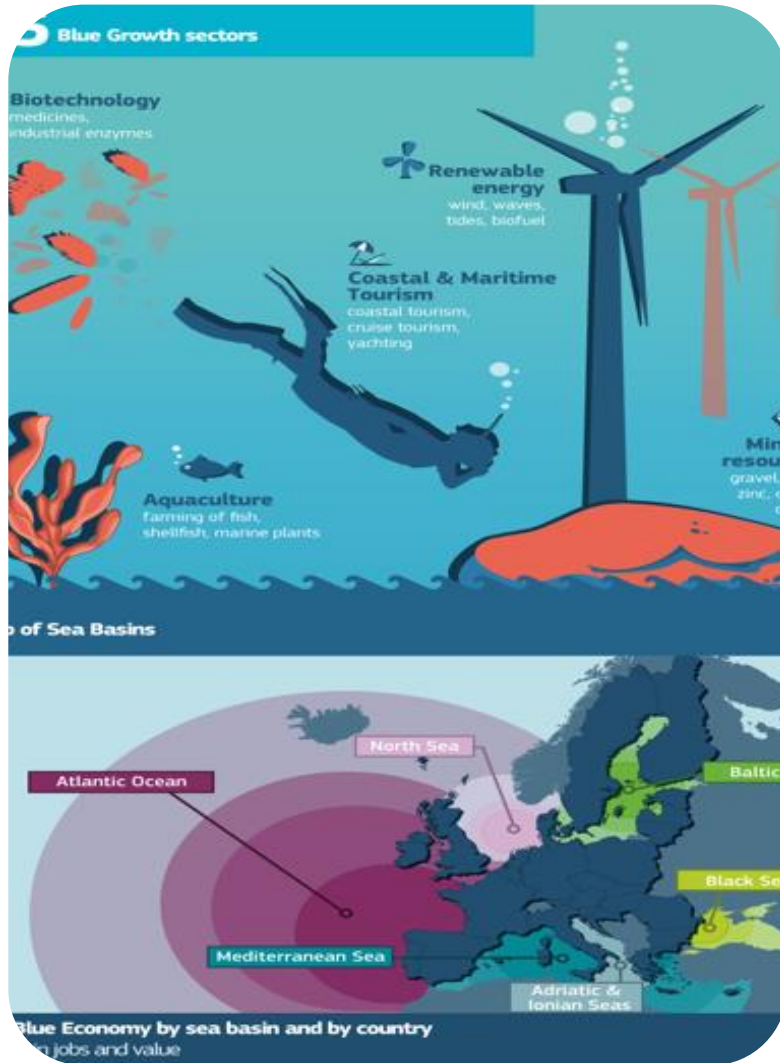
## European Environmental RI Scenario



EMSO is a large-scale distributed European RI, strategically placed. Consisting of seabed and water column observation nodes whose essential scientific objective is to observe in real time, and in the long term, environmental processes related to the interaction between the geosphere, the biosphere and the hydrosphere.



# EMSO ERIC's mission



To establish a comprehensive and intelligent sensor system in the water column, seafloor, and sub-seafloor environments.



# EMSO ERIC's science



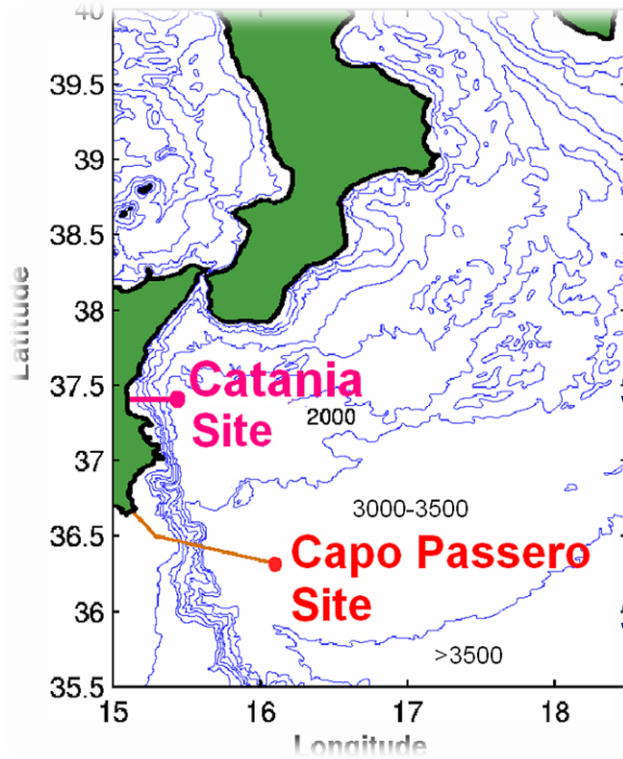
- ✓ **Geohazards:** slope stability, hydrothermal vents, tsunami, seismic and volcanic real-time monitoring
- ✓ **Climate Change:** ocean acidification, dynamics of water masses, deep underwater circulation, sea level rise
- ✓ **Marine Ecosystems:** biodiversity, pollution, sustainable fisheries, anthropogenic noise, marine mammal tracking, algal blooms

# EMSO ERIC's infrastructure components



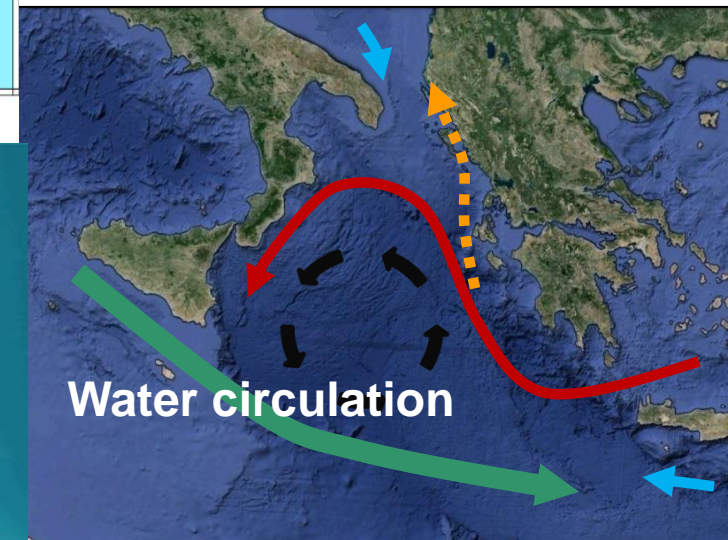
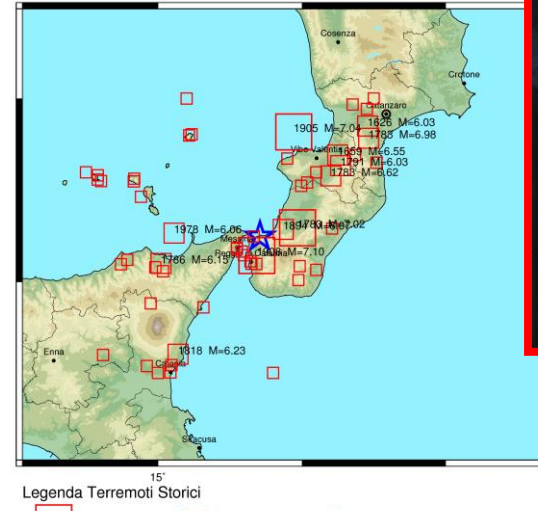
- CENTRAL MANAGEMENT OFFICE (CENTRAL HUB)
  - 11 FIXED POINT MUTI-SENSORS PLATFORMS:
    - 8 Deep Sea Observatories (Cable & Standalone)
    - 3 Test Sites, Shallow water
- +
- NOR-EMSO (gate to Arctic)**

# EMSO Western Ionian Facility



North-eastern  
Sicily (2100m bsl)

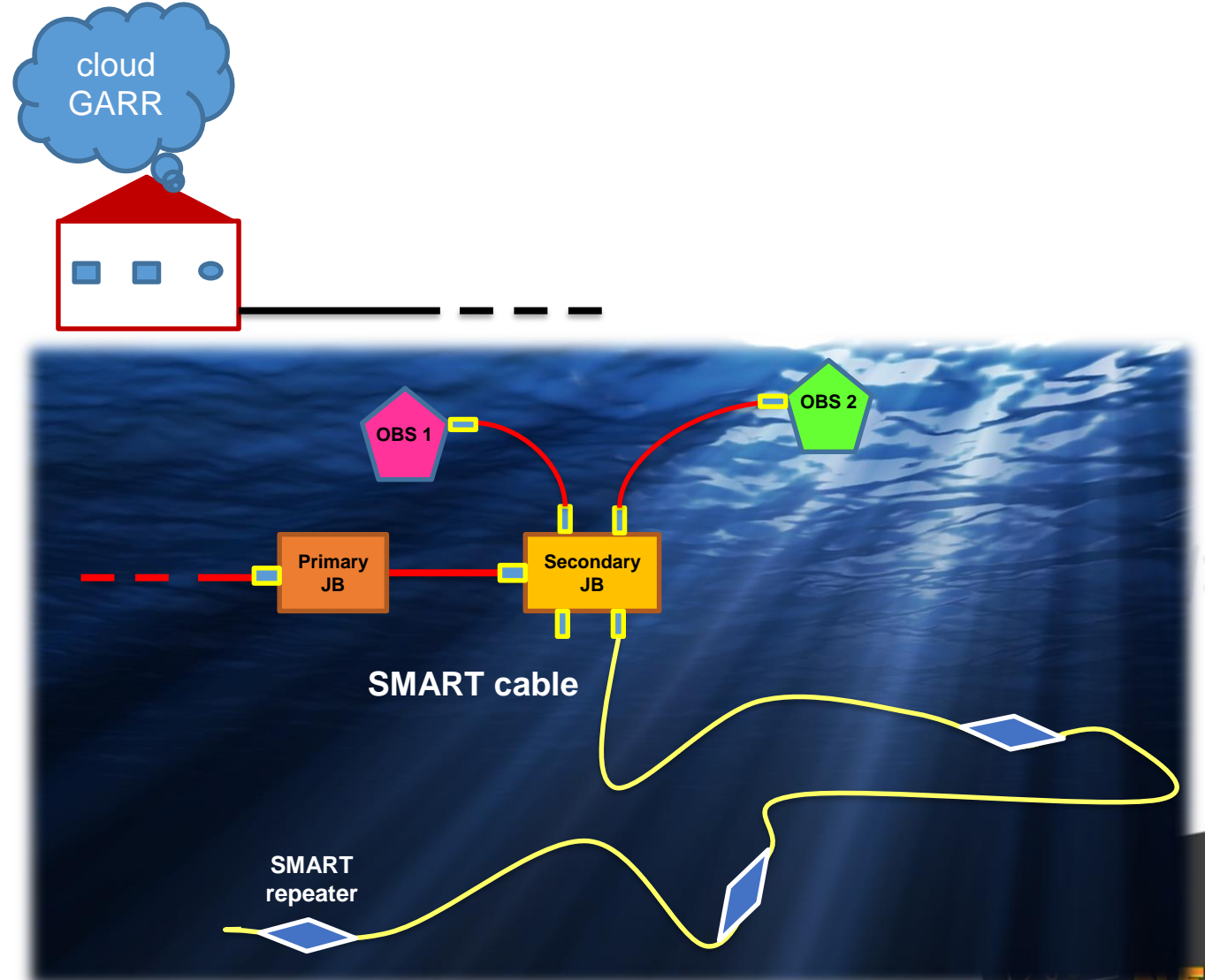
South-eastern  
Sicily (3500m bsl)



# PON InSea: Iniziative in Supporto al consolidamento e potenziamento dell'infrastruttura EMSO e delle sue attività

To realize an underwater lab with 4 new multi-parameter seafloor observatories in Catania and Portopalo sites and the first **SMART** cable wet demo experiment

by Bluetech





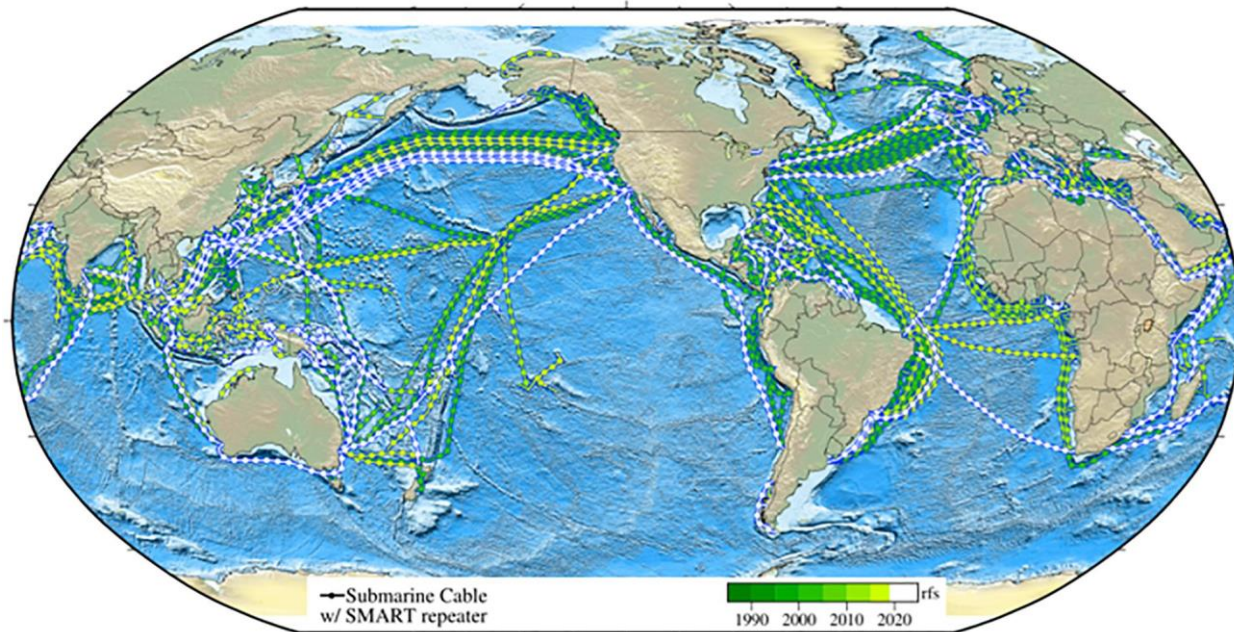
# PON InSea: SMART CABLE wet demo project



WMO

The International Telecommunication Union (ITU), the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (UNESCO/IOC), and the World Meteorological Organization (WMO) established the **Joint Task Force on SMART (Science Monitoring And Reliable Telecommunications) cable systems**

The JTF is developing a **strategy and roadmap** that could lead to enabling the availability of submarine repeaters equipped with scientific sensors for ocean and climate monitoring and disaster risk reduction (tsunamis). It will also analyze the potential renovation and relocation of retired out-of-service cables in this realm. With the installation of new trans-ocean and regional telecommunication cable systems equipped with sensors, a global network could be established providing decadal **real-time data for ocean climate monitoring and disaster mitigation (particularly from tsunamis)**



TeleGeography's Telecom Resources



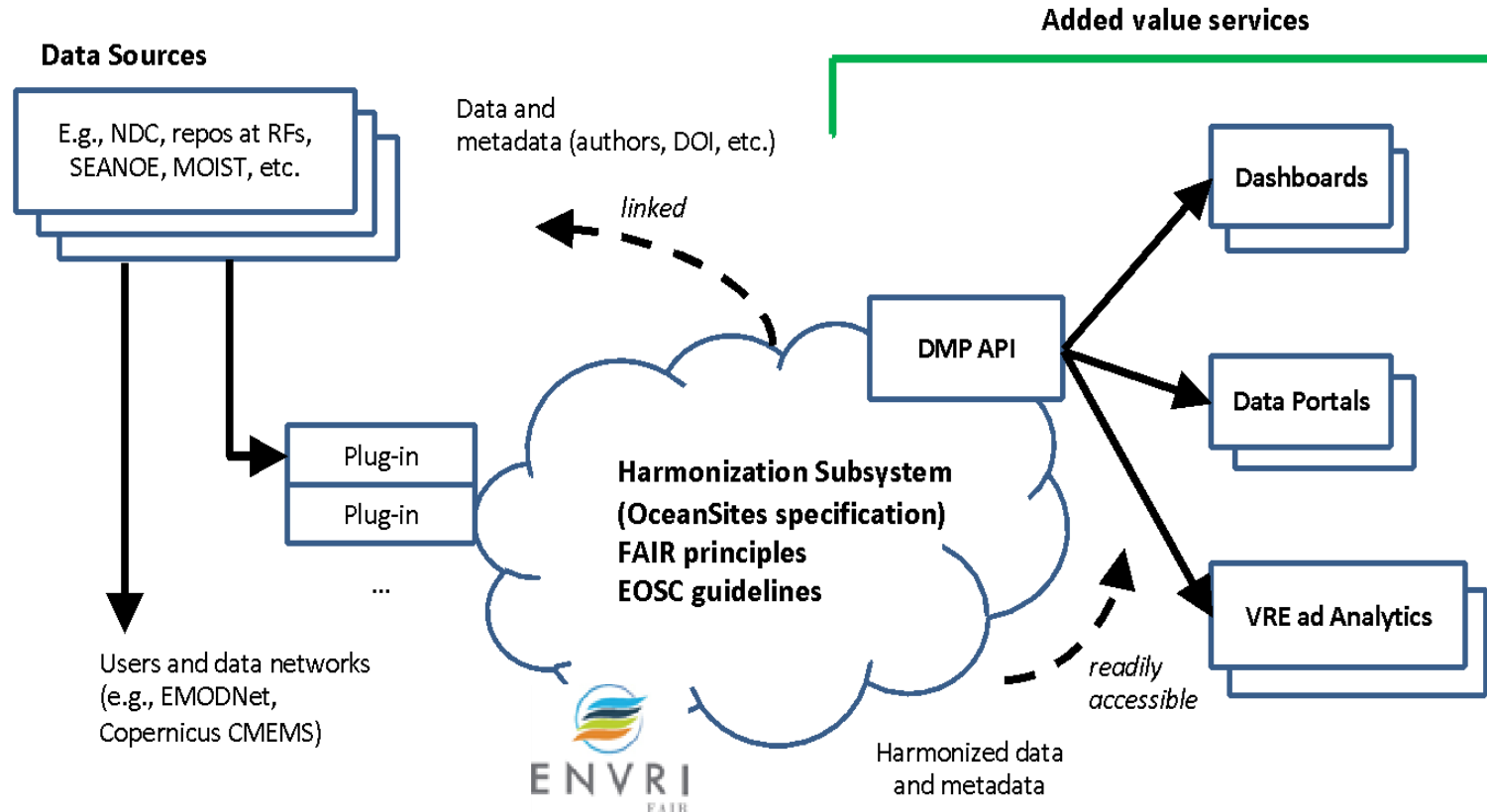
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# EMSO Data Management

We need an e-infrastructure to support the massive volume of data acquired

## Integrated EMSO ERIC Data Management Ecosystem



- **Harmonization**
- **FAIR principles (Findable, Accessible, Interoperable, Reusable)**
- **EOSC integration**
- **Engineering best practices:**
  - Scalability
  - Availability
  - Fault-tolerance
  - Cyber-security
- **Data portals**
- **Data tools**
- **Data analytics**

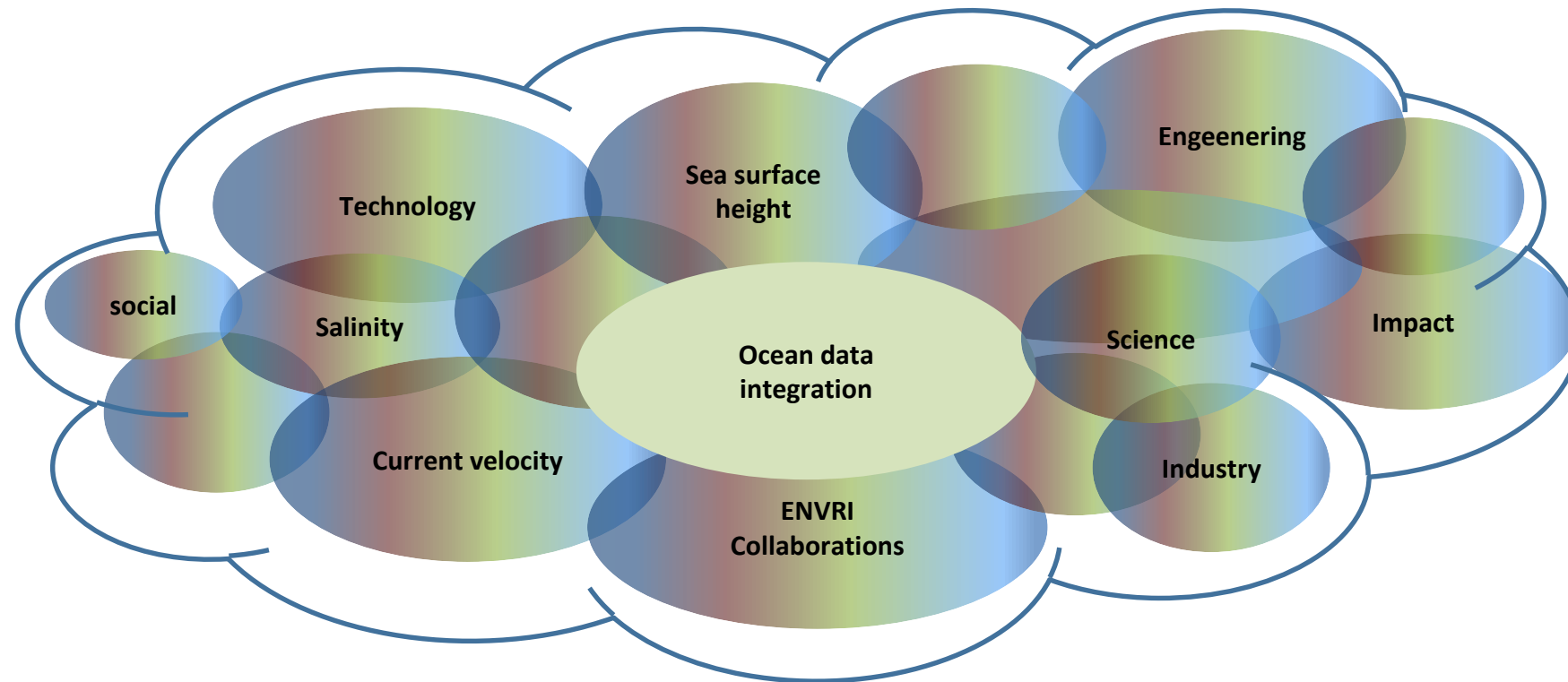
# Integrating DATA and KNOWLEDGE

## Harmonising Information

FOCUSSING ON QUALITY  
OCEAN OBSERVATIONS

PROMOTING  
COLLABORATIVE  
RESEARCH

PROMOTE THE USE OF DIGITAL  
OUTSTANDING SCIENCE



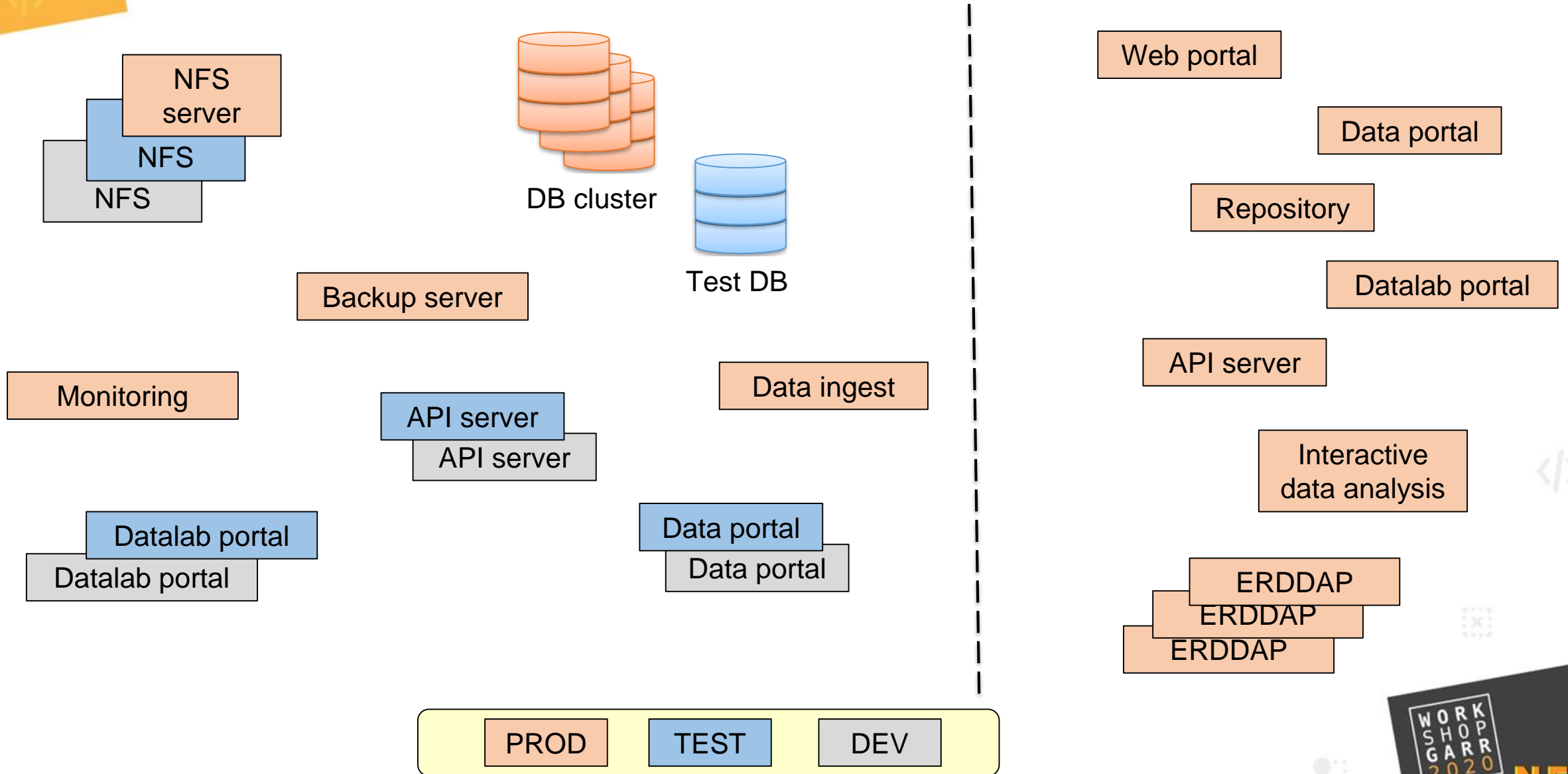
### DELIVERING SERVICES:

- Science
- Data and products
- Communication
- Engineering and Logistics (testing)
- Innovation & Industry
- External Relations

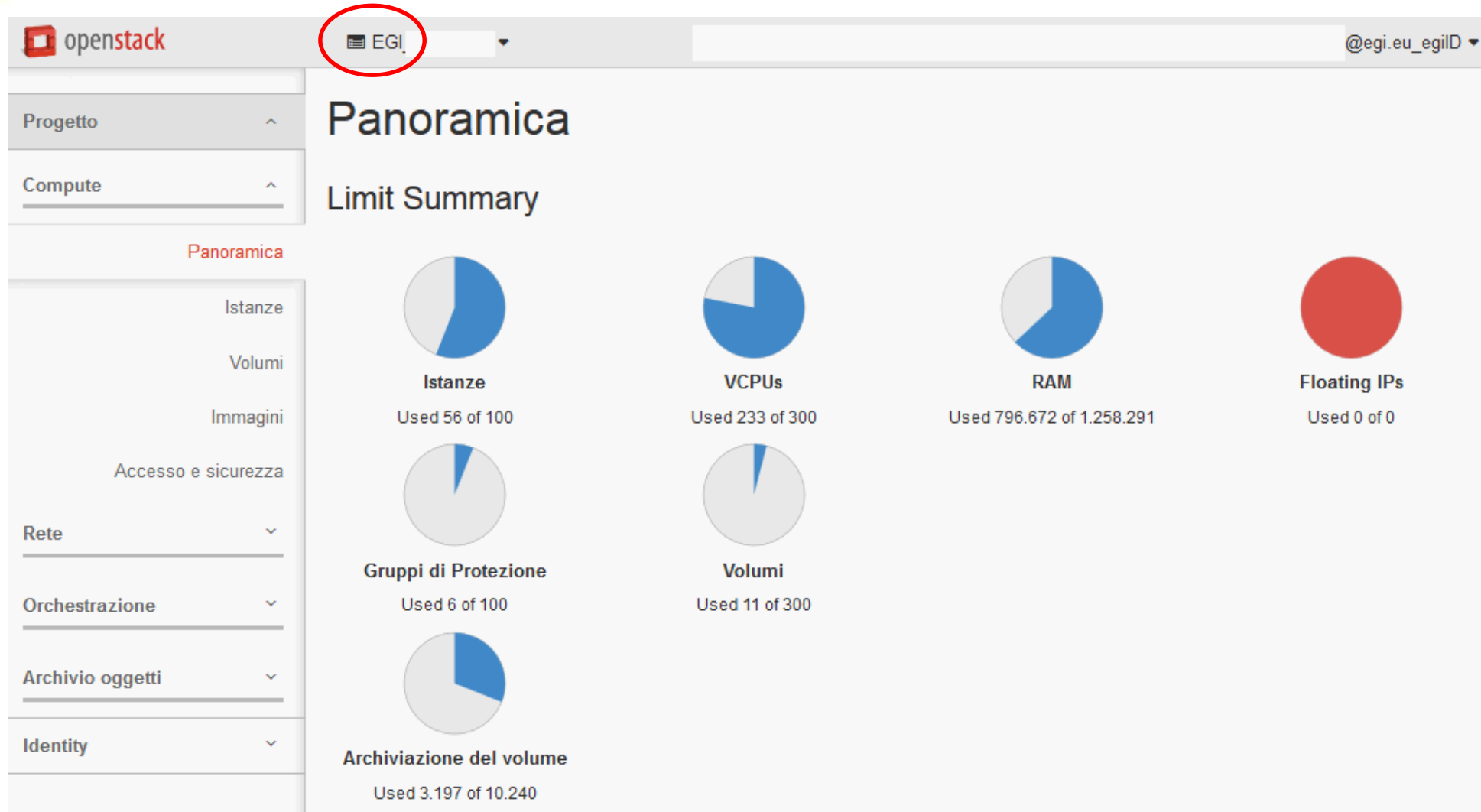
# EMSO services

Private

Public



# HW and SW environment



# Obiettivi



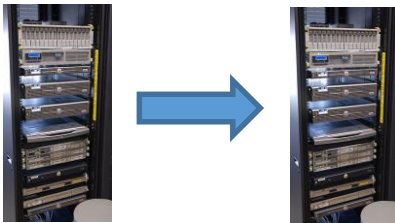
Datacenter di proprietà (PON infratstrutturale)

- >2400 core
- 36 TB ram
- >3 PB raw

Soluzione cloud open source



**openstack**<sup>TM</sup>  
CLOUD SOFTWARE



Replica su altri datacenter

# Perche' soluzione federata ? (1)

Soluzione gia' testata da GARR e funzionante

Modello di installazione semplificato / automatizzato, dal *bare metal* alla cloud computing di OpenStack

# Deploy

## Metal As A Service

- Discover, commission and deploy **physical servers**
- Allocate resources to match requirements.
- Retire servers when they are no longer needed.
- Cross datacenters provisioning

### Rapid provisioning at cloud scale

3-step provisioning process

Images Courtesy of CANONICAL

1



**Install MAAS on first server**

2



**Discover Nodes**

Automatically discover nodes  
Enlist nodes via PXE boot  
or manually enter MAC addresses

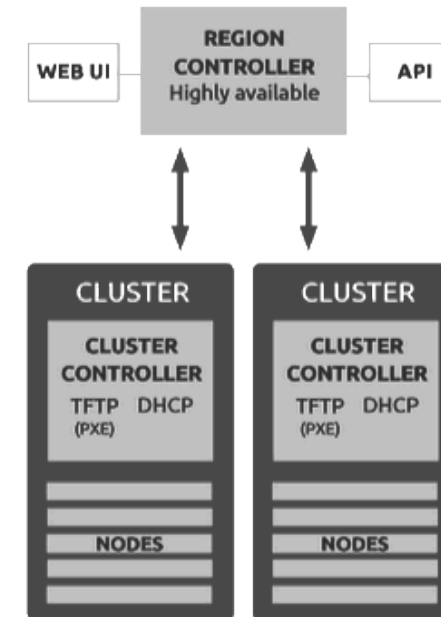
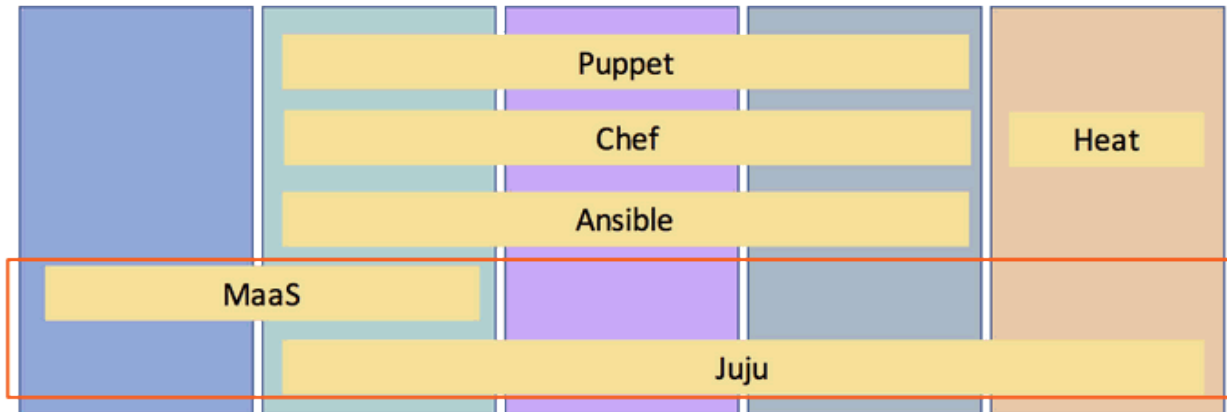
3



**Power on Nodes**

Hypervisor or OS  
provisioned automatically

Provisioning    Software    Configuration    State    Orchestration





# Perche' soluzione federata ? (2)

Soluzione gia' testata da GARR e funzionante

Modello di installazione semplificato / automatizzato, dal *bare metal* alla cloud computing di OpenStack

Supporto esperti GARR:

- *learning on the job*
- *knowledge transfer*

Mantenere controllo infrastruttura

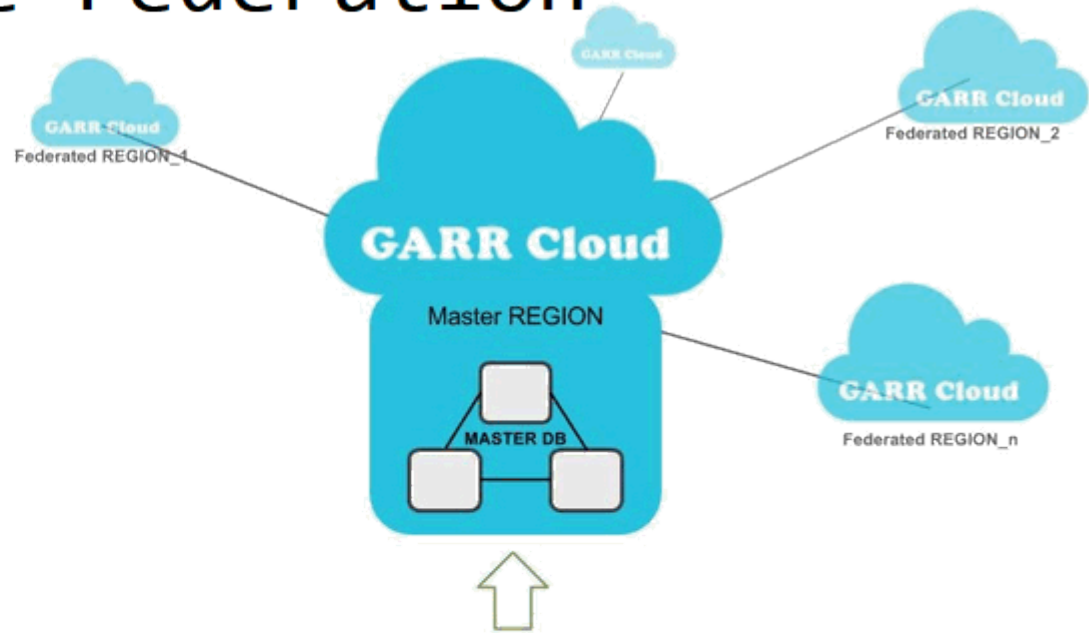
Possibilità di *offload* verso altre regioni

Soluzione con lunga aspettativa di vita, marketplace di riferimento ampio con grande comunità alle spalle

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# joining the Federation



## Procedure of inclusion

- Bundle OpenStack - attaches to validation cluster
- Validation in "DMZ" cluster
- No cleartext credentials exchange

## Different contribution options:

1. You own HW, but have no manpower/knowledge (yet)
2. You already have an OpenStack deployment (recent one)
3. None of the previous, but you have men-power

